The retreat from transitive-causative overgeneralization errors: A review and diary study

Ben Ambridge
University of Liverpool

Chloe Ambridge

In Current Perspectives on Child Language Acquisition. 113-130. John Benjamins Publishing Company, 15 Sep 2020.

"Well, we can't offer dreaming spires". Elena Lieven was in typically forthright mood at my Phd interview in early 2001. But I didn't want dreaming spires; Manchester had more than enough to offer, including a supervisory team made up of some of the leading child language researchers in the UK and Europe: Elena, Mike Tomasello and Anna Theakston. Elena had already had a significant impact on my career before I had even heard of her. It was one of Elena's PhD students, Julian Pine (now my neighbour at Liverpool), whose lectures at the University of Nottingham introduced me to the "No negative evidence" problem of the retreat from overgeneralization. And it was with this topic that – at Julian's suggestion – I approached Elena to apply for a PhD scholarship.

Amongst all the others, the most important piece of Elena's advice that I have carried through the past near-twenty years is this: No thesis, no study, no paper is perfect; so don't waste time trying to achieve the impossible. Do the best job you can in a reasonable timeframe and then move on. You've got your whole career to change the world.

The prescient nature of this advice because apparent all too quickly, as my PhD didn't quite go according to plan (does any?). Truth be told, the thesis was something of a rag-bag of studies, held loosely together by the theme of children's acquisition of grammatical constructions. The studies on the retreat from overgeneralization were in fact the weakest (and the only ones that remain unpublished) but were sufficiently promising that, when I moved on to a postdoc position, the topic remained – and still remains – my main research focus. It is also the focus of the present chapter, in which I test theories and predictions from the experimental work that begun during my PhD against diary data that I recently collected for my own daughter.

The problem is this: In order to be able to produce novel utterances – one of the hallmark characteristics of human language – speakers must use verbs in constructions in which they have never witnessed them in the input. At the same time, however, they must eventually learn to avoid producing verb+construction combinations that are deemed ungrammatical by native adult speakers. This is sometimes known as the problem of the "retreat from overgeneralization", since children seem to go through a period in which they produce exactly these types of errors, before retreating from them.

For example, many English verbs can appear in the [SUBJECT] [VERB] [OBJECT] transitive causative construction (e.g., *I broke the plate; I rolled the ball*). Accordingly, children form some kind of generalization that allows them to use in this construction verbs that have never been witnessed in this construction, and – indeed – novel verbs that have never been witnessed in *any* construction (e.g., *He's meeking it*); see Ambridge & Lieven (2011, 2015) for reviews. However, this generalization leads to errors, whereby a verb is *overgeneralized* into a construction in which it is ungrammatical for adults (e.g., *I'm dancing it* [= 'I'm making it dance']). In most cases (as in this example), the intended meaning of such utterances is relatively clear, and children are rarely corrected when they produce them

(hence, the "no negative evidence problem", Bowerman, 1988; though see Chouinard & Clark, 2003 for evidence that such corrections are considerably less rare than first thought). Given that, at best, such corrections are heard only sporadically, this raises the question of how children learn to stop producing such errors (hence, the "retreat from overgeneralization"). Indeed, even for children who produce very few errors of this type, the question still remains as to how they largely avoid such errors, while retaining the capacity to generate novel verb+construction combinations.

Three solutions to this problem – preemption, entrenchment and verb semantics – have been proposed; though it is likely that any successful account will in some way combine all three. Under the ***entrenchment*** hypothesis (Braine & Brooks, 1995), repeated occurrences of a particular verb (e.g., *dance*) contribute to an ever-strengthening probabilistic inference that it cannot be used grammatically in sentence constructions in which it has not yet appeared (e.g., **I'm dancing it;* the transitive). ***Preemption*** (Goldberg, 1995) is similar, except that only nearly-synonymous uses of the relevant verb (e.g., *X is making Y dance*; the periphrastic causative) contribute to this inference from absence.

Readers unfamiliar with this literature are invited to consider the following analogy, which is designed to explain more intuitively the difference between entrenchment and preemption (adapted from Ambridge, Barak, Wonnacott, Bannard, & Sala, 2018). Suppose that a naïve observer is trying to figure out whether it is acceptable to use the name *Lizzy* when addressing the Queen of the United Kingdom (analogous to trying to figure out whether it is permissible to use *dance* in the transitive causative construction; e.g., **I'm dancing it*).

- **Entrenchment** is summarized by the following internal monologue: "I've heard the name *Lizzy* used hundreds of times. Yet never, in all the royal greetings I've observed, have I heard someone address the Queen as *Lizzy*. Surely if this *were* allowed, I would have heard it by now. I will now therefore tentatively assume that it is not allowed".
- **Preemption** is summarized by the following internal monologue: "In all the royal greetings I've observed, people have addressed the Queen as *Your Majesty* and never as *Lizzy*, even though the latter would seem to convey the desired meaning (i.e., it *is* her name). I will now therefore tentatively assume that *Your Majesty*, rather than *Lizzy*, is the (more) permissible form of conveying this meaning (i.e., addressing the Queen).

To complete the analogy, consider a naïve observer who is trying to figure out whether it is acceptable to use *dance* in the transitive construction (e.g., **I'm dancing it*). In fact (as the conventional asterisk indicates), it is not.

- **Entrenchment:** "I've heard *dance* used hundreds of times. Yet never, in all of the transitive constructions I've observed, have I heard someone use *dance*. Surely if this *were* allowed, I would have heard it by now. I will now therefore tentatively assume that it is not allowed".
- **Preemption:** "For all of the caused-dancing descriptions I have observed, people have said *[CAUSER] made [CAUSEE] dance* and never *[CAUSER] danced [CAUSEE]*. I will now therefore tentatively assume that the former is the (more) permissible way of describing caused-dancing events.

Under the third solution considered here, the ***verb-semantics*** hypothesis, leaners form either class-based (e.g., Pinker, 1989) or probabilistic (e.g., Ambridge, Pine & Rowland, 2012) semantic restrictions on the types of verb that can appear in each construction. For example, the transitive construction ([SUBJECT][VERB][OBJECT]) is prototypically associated with

direct, physical, intentional causation (e.g., Hopper & Thomson, 1980). Hence verbs which denote actions that also tend to involve direct physical causation are a good semantic fit for the transitive construction (e.g., *I broke/smashed the plate*). Verbs that denote internally-caused events, those for which the entity undergoing the action enjoys a good deal of autonomy with regard to whether and how the event takes place (e.g., *dance, smile, sing*) are a poor semantic fit for the transitive construction, hence an ungrammatical utterance results (e.g., **I smiled/danced/sang him*). Such verbs are a natural fit for the intransitive construction (e.g., *He smiled/danced/sang*), and causativize by means of the periphrastic causative construction (e.g., *I made him smile/dance/sing*)

All three hypotheses – entrenchment, preemption and verb semantics – enjoy considerable support from experimental grammaticality judgment studies. Bidgood, Pine, Rowland and Ambridge (submitted) conducted a meta-analysis of adult and child grammaticality judgment studies that operationalized entrenchment and preemption using corpus-derived chi-square verb-bias measures (semantic measures were too heterogeneous for meta-analysis).

For preemption (see Table 1), the chi-square measure reflects the extent to which a particular verb (e.g., *laugh*) is similar to other verbs in the corpus with regard to its distribution across the two competing constructions (here, the transitive versus the periphrastic causative; e.g.**The man laughed the girl* vs. *The man made the girl laugh*). The chi-square statistic is calculated according to the standard formula shown in Table 1, and subsequently natural-log transformed. Finally, because the chi-square test is non-directional, it is necessary to set the sign to positive if, relative to other verbs in the set, the verb in question is biased towards the transitive (and away from the periphrastic) and to negative if it is biased towards the periphrastic (and away from the transitive). For example, as shown in Table 1, *laugh* exhibits a strong bias away from the transitive and towards the periphrastic, reflected by a large negative value. Conversely, *break* (not shown) exhibits a strong bias towards the transitive and away from the periphrastic, reflected by a large positive value.

Table 1. Calculation of the *transitive-vs-periphrastic* preemption measure for the verb *laugh* (+=bias towards transitive, - = bias towards periphrastic)

	transitive (X VERB Y)	*Periphrastic* (X MAKE Y VERB)
laugh	(A) 31	(B) 101
all other verbs (summed)	(C) 477905	(D) 483

$$\frac{(A*D-B*C)^2 * (A+B+C+D)}{(A+C)*(B+D)*(A+B)*(C+D)}$$

$$\frac{(31*483-101*477905)^2 * (31+101+477905+483)}{(31+477905)*(101+483)*(31+101)*(477905+483)} = 61713.26$$

Natural log (1+61713.26) = 11.03
Preemption predictor value = - 11.03 (bias away from transitive and towards periphrastic)

The entrenchment predictor (see Table 2) is calculated in a similar way, except that non-target uses (see the two rightmost cells) are defined not as uses in a specific competing construction, but rather as all other corpus occurrences of that verb (except those already counted towards the preemption predictor).

Table 2. Calculation of the *transitive-sentence-target* entrenchment measure for the verb *laugh* (+ = bias towards transitive, - = bias away from transitive)

	transitive (X VERB Y)	*Non-transitive (excluding periphrastic)* (e.g,, X VERB)
laugh	(A) 31	(B) 8115
all other verbs (summed)	(C) 466905	(D) 1121630

$$\frac{(31*1121630-8115*466905)^2 * (31+8115+466905+1121630)}{(31+466905)*(8115+1121630)*(31+8115)*(466905+1121630)} = 3296.20$$

Natural log (1+3296.20) = 8.10
Preemption predictor value = - 8.10 (bias away from transitive and towards non-transitive)

Using this methodology, Bidgood et al (submitted) observed meta-analytic effects of both entrenchment and preemption across transitives (e.g., **The man laughed the girl*), intransitives (e.g., **The dough's making* [c.f., *He's making the dough*]), locatives (e.g., **He filled water into the cup; *He poured the cup with water*), datives (**He said her hello; His mistake cost £10 to her* [c.f., *His mistake cost her £10*) and *un-* prefixation (e.g., **unsqueeze, *unsit*, [c.f., *unbutton, unbuckle*]). Both effects held even using a conservative statistical test (model comparison) that investigates effects of entrenchment above and beyond preemption, and vice-versa and – crucially – across grammaticality judgment data from both adults and children.

With regard specifically to the intransitive and transitive constructions, Bidgood et al. (submitted) had adult and child participants rate not only *transivization* errors in which intransitive-only verbs are used in transitive sentences (e.g., **I'm dancing it*), but also *intransitivization* errors, in which transitive-only verbs are used in intransitive sentences (e.g., **The dough's making* [c.f., *He's making the dough*]). For these latter errors, passive uses (e.g., *The dough's being/getting made*) were taken as the preempting forms. Bidgood et al observed significant relationships between the entrenchment and preemption measures and participants' preference for transitive over intransitive uses or vice versa.

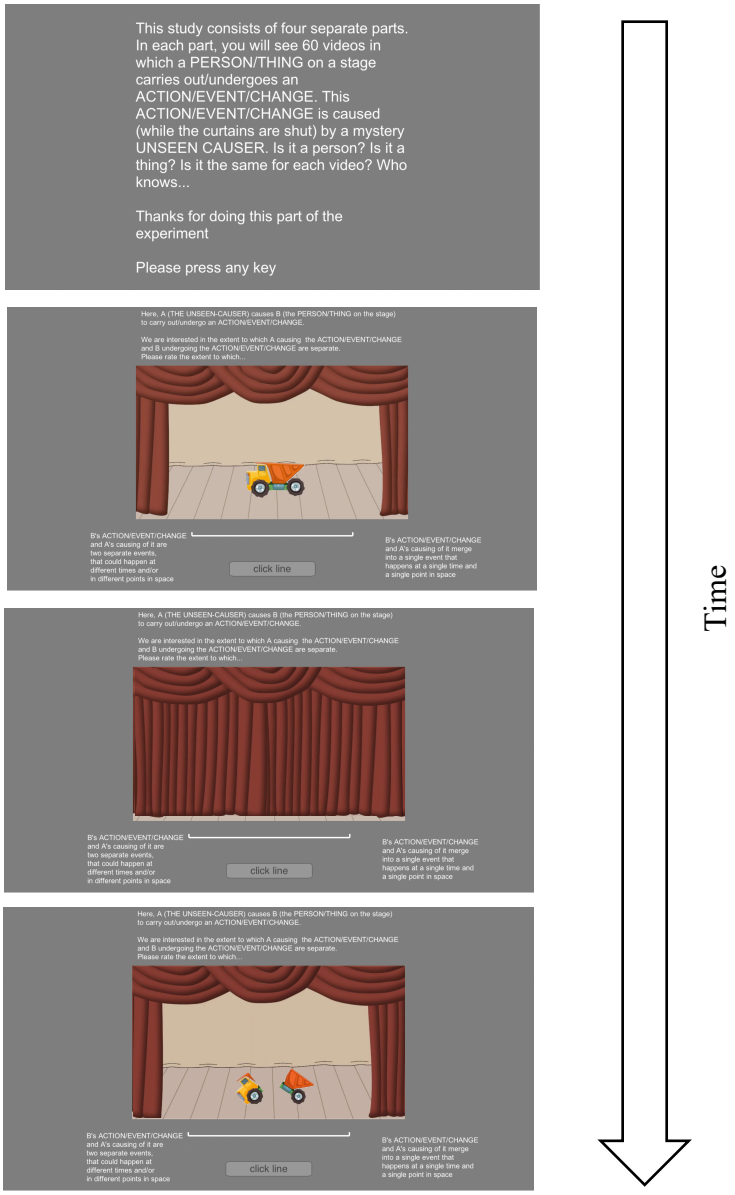
Bidgood et al (submitted) also observed an effect of verb semantics. A separate group of adult participants were asked to rate verbs on an "event-merge" measure designed to capture the extent to which verbs are semantically compatible with the transitive versus intransitive construction, based on Shibatani and Pardeshi's (2002) notion of a causative continuum:

- For ***semantically-intransitive*** verbs (e.g., *dance*), causation entails an event in which "both the causing and the caused event enjoy some degree of autonomy…The caused event… may have its own spatial and temporal profiles distinct from those of the causing event.
- For ***semantically-transitive*** verbs (e.g., *kill*), causation entails a spatio-temporal overlap of the causer's activity and the caused event, to the extent that the two relevant events are not clearly distinguishable"

Accordingly, for each verb, participants saw a cartoon animation depicting the caused event (but with the causing event hidden from view behind curtains), and were asked to rate it on a visual analogue scale with the following anchors (see Figure 1 for an example)[1]:

- (Left) B's ACTION/EVENT/CHANGE and A's causing of it are two separate events, that could happen at different times and/or in different points in space.
- (Right) B's ACTION/EVENT/CHANGE and A's causing of it merge into a single event that happens at a single time and a single point in space

Figure 1. Adult semantic rating task



[1] Figure 1 and Tables 6-7 have been previously published under a creative commons CC BY 4.0 license, which allows unlimited reproduction, provided the original source is credited. The original source is: 10.6084/m9.figshare.8108906

Across verbs, this semantic event-merge score was found to significantly predict the degree to which participants deemed transitive sentences (e.g., **Someone danced the boy*) to be grammatically acceptable, relative to intransitive equivalents (e.g., *The boy laughed*). Similar semantic effects for the intransitive and transitive constructions were observed more informally in Ambridge, Pine, Rowland and Young (2008) and Ambridge, Pine, Rowland, Jones & Clark (2009). Semantic effects for the locative, dative and *un-* prefixation constructions (based on ratings of different semantic properties) were summarized in Ambridge, Barak, Wonnacot, Bannard & Sala (2018). In brief

- For the locative constructions, a positive correlation was observed between the relative acceptability of (a) figure-locative versus (b) ground-locative forms and the extent to which the relevant verb was judged (by independent raters) to exhibit semantic properties associated with (a) X causing Y to GO (IN/ON)TO Z in a particular MANNER versus (b) X causing Z to undergo a STATE CHANGE; the meanings of these constructions. For example, one can pour water into a cup (GO IN in a particular MANNER) whether or not the cup ends up full (i.e., even if there is no STATE CHANGE). Conversely, one can fill a cup with water (causing the cup to undergo a STATE CHANGE) regardless of the particular MANNER used (pouring, turning on a tap, dipping it in a bath etc.).
- For the dative constructions, a positive correlation was observed between the relative acceptability of (a) PO- versus (b) DO-dative forms and the extent to which the relevant verb was judged (by independent raters) to exhibit semantic properties associated with (a) *X causing Y TO GO TO Z* versus (b) *X causing Z to HAVE Y*; the meanings of these constructions. For example, one can send a child to bed but not **send bed a child* (DO), because the event is one of causing to GO, not causing to HAVE. Conversely, one can *give someone a headache* (DO) but not **give a headache to someone* (PO), because the event is one of causing to HAVE, not causing a headache to GO from one person to another.
- For the un-prefixation construction, a positive correlation was observed between the acceptability of forms prefixed with *un-* and the extent to which the relevant verb was judged (by independent raters) to exhibit a constellation of semantic properties thought to characterize the verbs that can appear with this prefix (e.g., covering, enclosing, surface-attachment, circular motion, hand-movements, change-of-state). For example, one can *unbutton* and *unbuckle*, but not **unsqueeze* or **unsit*.

In summary, at least on the basis of the analyses and meta-analyses reported in Ambridge et al (2018) and Bidgood et al (submitted), the entrenchment, preemption and verb semantics hypotheses appear to be in rude health, for both English verb argument structure constructions in general and the in/transitive constructions in particular,

However, the outlook for these hypotheses is much less rosy when we turn from experimental grammaticality judgment data to diary data. Diary data are particularly crucial when investigating argument structure overgeneralization errors, because although such errors appear occasionally in recordings of children's spontaneous speech, they do so with insufficient frequency to allow for detailed quantitative analyses. Lord's (1979) diary study lists 71 different intransitive verbs (or verbal predicates, since many are of the form BE+adjective) that her daughter Jennifer and son Benjy used incorrectly in transitive constructions between the ages of 2;5 and 4;6, as shown in Table 3.

Table 3. One-argument verbs used with two arguments by Jennifer and/or Benjy (from Lord, 1979)

go	sit	dive	spill over	(be) straight
go up	lie	wade	overflow	(be) sharp
come	run	float	sound	(be) tight
come up	scram	bleed	order	(be) intact
come out	fly	cough	be (on)	(be) inside
come off	gallop	itch	stick out	(be) inside-out
stay	climb	feel	pop	(be) upside-down
fall	ride	sleep	reach	(be) plural
fall down	jump	faint	(be) cold	(be) interest(ing)
fall off	jump down	live	(be) hot	(be) full
fall out	dance	disappear	(be) short	(be) stuck
slip down	swim	answer (reply)	(be) frozen	(be) caught
leave (depart)	sing	clap	(be) flat	(be) lost
stand up	leap	blow	(be) curly	(be) on
				(be) off

Although Lord (1979) does not present any data on the relative frequency of these errors, it is clear that her list includes errors with verbs that are very frequent overall (e.g., *go, come, fall, stay,*), and relatively frequent in the periphrastic-causative construction (e.g., *make X go/come/fall/stay*). Indeed, according to the counts reported in Bidgood et al (submitted), on both entrenchment and preemption measures, *come* and *go* are two of the three verbs that are most strongly biased against transitive uses, with *fall* and *stay* not far behind. Thus, the occurrence of errors with these verbs would seem to be somewhat problematic for both the entrenchment and preemption hypotheses. The verb semantics hypothesis does not fare much better. Lord (1979) lists transitivization errors with some of the verbs rated in Bidgood et al (submitted) as the most semantically intransitive, including *come, stay* and *sing*.

Conversely, Lord (1979) also lists 55 transitive-only verbs that her daughter and son used incorrectly in intransitive sentences (i.e., intransitivization errors), as shown in Table 4.

Table 4. Two-argument verbs used with one argument by Jennifer and/or Benjy (from Lord, 1979)

hear	lift	make	hold	eat
see	lift up	finish	hold up	swallow
look (at)	keep up	take out	keep down	bother
attract	push	put on	knock down	bite
leave	drop	take off	knock over	scrape
lose	pull	step (on)	mix up	tape
waste	pull out	kick	stuff	
draw	pull off	blow	throw	
read	pick up	drive	set off	
spell	dump	tie	undo	
time	vacuum up	fix	rent out	

According to the data obtained by Bidgood et al (submitted), the verbs *kick* and *leave* are some of the most strongly biased against the intransitive construction in terms of both entrenchment/preemption and semantics. Most of the other intransitivized verbs listed by Lord (1979) were not included in the stimulus set of Bidgood et al, but – on the face of it – do not appear to be either of particularly low frequency or to have particularly transitive-consistent semantics. In summary, then, Lord's (1979) diary data do not sit particularly comfortably with the entrenchment, preemption or verb-semantics accounts: The entrenchment and preemption hypothesis predict that errors should be common for verbs with, respectively, low overall frequency and low frequency in competing constructions. In fact, errors are common even for high-frequency verbs. The verb-semantics hypothesis predicts that intransitivization errors should be rare for highly semantically transitive actions, while transitivization errors should be rare for highly semantically intransitive actions. Neither of these predictions seems to hold true.

The situation would appear to be similar for the transitivization errors reported in the diary data of Bowerman (1982), shown in Table 5 (ages 2;6-6:11).

Table 5. Transitivization errors with verbs (or verbal predicates, in some cases children's novel creations) reported in Bowerman (1982).

go (x8), be (x6) come (x4), stay (x5), die (x5), fall (x4), eat (x3), sing (x3), disappear (x3), higher (x3), rise/up (x3), have (x3), round (x3) fill/full (x2), hot/heat (x2), , drink (x2), talk (x2), remember (x3), down (x2), sweat (x2), watch (x2), bleed (x2), comfy/comfortable(x2), ache (x2), giggle, vanish, cry, spell, round, guess, climb, off, colder, nice, wish, unstuck, feel, dizzy,

Of course, given that we do not have data on correct uses, it is possible that verbs which show high absolute rates of error (e.g., *go, be, come* and *stay*) might show – relative to all children's uses of these verbs – relatively low rates of error. Nevertheless, on the face of it, the finding that transitivization errors are relatively common with some of the verbs that are most strongly biased *against* the transitive construction on the entrenchment, preemption and verb-semantics accounts does not look good for these theories. Indeed, reviewing these errors more systematically, Bowerman and Croft (2007) concluded "there is little evidence in our data for sensitivity to semantic categories. In particular, the children causativized verbs expressing animate, internally-caused events (severe violators of semantic constraints on the causative alternation) just as robustly as unaccusative verbs expressing externally-caused events (far less severe violators)".

My goal in the present chapter is to argue that, in fact, we should not *expect* children's spontaneous overgeneralization errors (as opposed to their experimental judgment data) to conform to the predictions of the entrenchment, preemption and verb-semantics hypotheses. The reason is that, as neatly demonstrated in a recent study (Harmon & Kapatsinski, 2017) production involves satisfying two competing demands. On the one hand, the speaker is trying to conform to the grammatical norms of her speech community, and using mechanisms such as entrenchment, preemption and semantic verb-construction compatibility to avoid violating those norms. On the other hand, the speaker is trying to convey meanings, including – particularly for children – novel meanings, for which she does not have yet the right vocabulary or syntax. This latter demand pulls in the direction of errors. Indeed, in a series of artificial grammar learning studies with adults, Harmon and Kapatsinski (2017) found that high-frequency forms are particularly resistant to generalization in a receptive comprehension task (due to mechanisms such as entrenchment, preemption and verb semantics), but are

particularly prone to generalization in a production task, because their high frequency makes them more readily available for novel uses.

In the remainder of this chapter, I therefore consider diary data of my daughter's overgeneralization errors in terms not of the entrenchment, preemption and verb semantics hypotheses, but in terms of their *communicative function* (an approach which chimes with the theme of this volume; that language learning is a dynamic interaction between the child and her environment). The diary data are summarized in Tables 6-7, which show all noted argument structure overgeneralization errors up to Chloe's fourth birthday, by which time they seemed to have all but ceased, except for errors with *die*. I focus on transitivization errors with intransitive-only verbs (see Table 6), which constitute by far the most frequent type. For completeness, overgeneralizations for other constructions (locative and dative) are also shown (see Table 7), though these are rare and not discussed further. Intransitivization errors (8 occurrences, all with different verbs) are more common, though appear to be idiosyncratic rather than following a particular pattern, and – though also shown in Table 7 – are not discussed further.

Table 6. Diary data: Transitivization errors

Age	**Error**
2;3	Can you reach me? (Already being held, wants lifting up higher to touch sparkly part of a sign)
2;4	Can you jump me off? (wants help jumping down off the bed)
2;4	Did you drop the letters? (="Did you make the letters drop?" Foam letters stuck to the bathroom wall have fallen into the bath)
2;6	(Dad: why are you running?) It's practising me to run like that
2;6	jump me!
2;6	Don't swim me
2;7	run me down, jump me down (wants to run down slide)
2;7	jump me
2;7	drink me. drink me, Dad! (Can't reach juice in bottom of cup and wants it tipped right back)
2;7	I'm just dancing it (shaking the bent-double flap of the elephant's door in Dear Zoo, to make it dance)
2;7	I can dance it (book)
2;7	I'm dancing it
2;7	This is the boat - swim it!
2;7	Swim that aeroplane (submarine)
2;7	Stay your leg up there (holding dad's leg)
2;7	Stop jumping them (Dad is tapping rabbits in Peter Rabbit game to make them jump)
2;7	drink me a bit (wants straw held up to her mouth to drink squash in bed)
2;10	The sheet's slipping me
2;11	jump me, Dad! x5
2;11	I jumped my legs. I hopped my legs
3;2	I stand on your feet and you walk me
3;2	(Mum: what happens to the rubbish when it goes outside?). It gets died.

3;5	(Dad, playing with Shopkins: Now what are we doing?) Chloe: Going them in. (What?) Into the bathroom
3;6	I'm try to duck her under (pushing Aurora doll under the seat belt of Barbie car)
3;6	Pens are difficult to come off the paper
3;7	Reach me up there (wants to see toys on top shelf)
3;7	It will get died [die/get killed]
3;7	That nearly feeled me like I'm nearly falling off
3;8	I'm going it faster (exercise bike at airport)
3;8	Eat it in my mouth (pez sweet that has fallen onto floor - wants Dad to pick it up and post it into her mouth)
3;8	Disappear them and disappear them (scooping up bubbles in the bath)
3;9	Your turn to dance me, Dad (i.e., swing her around by the arms)
3;10	Those guys died Maleficent (watching Sleeping Beauty)
3;10	We died (dissolved) Mummy's special soap didn't we, Dad?
3;11	jump me up there (wants putting onto the toilet seat)
3;11	I wanna jump her in (Ariel doll into bath)
3;11	It will die you; it will make you killed
4;0	Mermaids have got special powers; they can die baddies
4;7	jump me x 2

Table 7. Diary data: Other argument structure overgeneralization errors

Age	**Error**	**Type**
2;5	I want to dip it in my finger (Marmite)	Locative
2;7	You bounce it and it throws. You bounce it and throw it (ball)	Intransitivization
2;9	Dad, you poured the wall all messy (Dad poured water onto tree and it splashed onto garden wall)	Locative
2;9	It doesn't push over (trying to push over Conway Castle)	Intransitivization
2;9	I want them to make like shorts (annoyed because her rolled up trouser legs fell down)	Intransitivization
2;11	Pour him! (pouring water onto doll)	Locative
2;11	Does it push? (Button on playmobil digger; not sure if it can be pressed, or is just a pretend button)	Intransitivization
3;6	Let's marry (get married; playing Snow White and Prince)	Intransitivization(?)
3;6	Look what creates in the sink: Bubbles, that's what creates in the sink (squirting handwash into sink full of water)	Intransitivization
3;7	You touched it to me and it was cold (water glass on leg)	Locative
3;7	You touched it onto the water (toy in Bath)	Locative
3;7	I just made that, now it's all ruining [getting ruined, by Dad]	Intransitivization
3;10	I need to fill them in there (can't get pens into pencil case)	Locative
3;10	The salt dough's making in the oven	Intransitivization

3;10	Don't call it to me (=Don't call me it. Is calling Dad "Captain bot-head" and doesn't want to be called the same in return)	Dative
4;7	(Dad: Do you say 'cover them [chips] with ketchup' or 'cover ketchup onto them'?) No not cover ketchup onto them!	Locative

My argument in this chapter is that the majority of these transitivization utterances, although errors from the point of view of the adult grammar, are in fact perfectly matched to the communicative needs of each situation; *more* so in fact than the corresponding adult forms (periphrastic causatives) would have been.

Consider, for example, Chloe's most frequently-transitivized verb, *jump* (12 occurrences). Why is it exactly that *jump* resists the transitive-causative construction in the adult grammar? According to semantics-based account such as Pinker (1989: 302), the reason is that such verbs denote actions which "have internal causes that would make any external prodding indirect". A similar notion is captured in Shibatani and Pardeshi's (2002) event-merge measure. If I break a cup and the cup breaks; these two events are one and the same. But if I make a loud noise and you jump; these are two separate events. This is why I can *make you jump*, but I can't **jump you*.

But what does Chloe mean when she says, "Can you jump me off?", "Jump me!", "Jump me down (the slide)!", "Jump me up there!"? She clearly does not mean 'Do something that indirectly causes *me* to instigate an internally-caused jumping action'. She means 'Pick me up and move me upwards'. The type of causation she has in mind is single-event, direct, external causation, of almost exactly the same type that is involved in breaking a cup. In short, she doesn't mean 'make me jump!', she means 'jump me!'.

Consider now, Chloe's second most frequently transitivized verb, *die* (8 occurrences). This is somewhat of a special case, given that, in one sense, this represents nothing more than her failure to master the lexical suppletive form, *kill*. On the other hand, the very reason that causative-*die* HAS a lexical suppletive form, when almost all other verbs do not, is that directly-caused dying is something that speakers (even toddlers, apparently) frequently want to discuss. When Chloe says, "Mermaids have got special powers; they can die baddies", she does not have in mind indirect, two-event causation, but direct, single-event causation, of the type that English chooses to lexicalize with *kill*. (As an aside, it is interesting to note that causativized *die* and the lexical alternative *kill* seem to coexist at the later stage of this diary data [3;11; "It will die you; it will make you killed"]. This observation is compatible with accounts under which overgeneralized and correct forms compete in memory over an extended period (e.g., MacWhinney, 2004; Maslen, Theakston, Lieven & Tomasello, 2004; Ramscar & Yarlett, 2007; Ambridge, in press).

It is a similar story for *dance* ("I'm dancing it", "I can dance it", "Your turn to dance me, Dad"). The meaning is not 'make me dance' (e.g., by playing music), but physically 'dance me'. Likewise, for *eat* and *drink* ('cause the food/liquid to go into my mouth'), *swim* ('physically propel me through the water'), *reach* ('lift me up'), *walk* ('move my legs'), "*go* it faster", "*go*[ing] them in", *disappear* and *run*.

In fact, this phenomenon is not restricted to childhood. As noted by, amongst others, Pinker (1989) the adult grammar allows transitivizations that would otherwise be considered erroneous, when it is clear that the causation that the speaker has in mind is too direct to be properly conveyed by the periphrastic causative; for example "when an advertisement for an amusement park says…*We're gonna scream ya, and we're gonna grin ya*" (Pinker, 1989: 348). Similarly, although *disappear* is often discussed as a prototypical example of a verb that resists transitivization, it is not uncommon to read about dictators disappearing their

enemies. While you can't normally *walk* an adult, you can walk a dog and probably even a child (at least, you can *walk her to school*); and (although Elena has been known to baulk at Americanisms) a baseball pitcher can walk a batter.

Thus these rather humble diary data actually suggest a rather radical conclusion: The compatibility of a particular verb with a particular argument structure construction is determined, at least to some extent, not in the lexicon or in the grammar, but in real-world event semantics: If the type of causation you have in mind is direct, external, single-event causation, then the transitive causative construction is more appropriate than the periphrastic causative construction, even if this requires coercing the verb into a construction in which it almost never appears. On this account, at least part of the reason why verbs such as *jump, dance, eat, drink, swim, reach, walk, go, disappear* and *run* resist the transitive causative construction is not their frequent appearance in the competing periphrastic causative construction (preemption), nor even their semantic incompatibility *per se* with the transitive-causative construction. It is simply that, in the adult world, we almost never find ourselves in a situation in which one person causes another to *jump, dance, eat* and so on by means of direct, external, single-event causation. Bresnan & Nikitina (2008) make a similar claim with regard to the dative constructions: The reason that verbs such as *carry* resist, to some extent, the double-object dative construction (*?I carried her the book*) is that, in the modern world, this type of possession-transfer would more usually be accomplished by an event of *driving* or *mailing* than *carrying*. Double-object dative uses of *carry* were more common and more acceptable, Bresnan and Nikitina (2008) argue, in the pre-automotive age.

Impressed by arguments of this type, I briefly flirted (Ambridge, Pine, Rowland, Jones & Clark, 2009) with the idea that event semantics might be sufficient to solve the problem of the retreat from overgeneralization, with preemption/entrenchment effects entirely epiphenomenal (e.g., *jump* is heard more frequently in the periphrastic- than transitive-causative simply because jumping is almost always indirectly rather than directly caused, and there is no need for the learner to be sensitive to verb+construction cooccurrence statistics). I was quickly disabused of this view by the observation that some collocations (e.g., *manage to VERB/succeed in VERBing vs *succeed to VERB; *manage in VERBing*) seem to be entirely arbitrary, and hence require some form of surface distributional learning (e.g., Herbst & Stefanowitsch, 2011). However, the data discussed in the present article suggest (at least to me) that all *semantic* effects observed in this domain are effects of event-level rather than verb-level semantics; how else to explain the fact that the acceptability of, for example, *walk* in the transitive causative construction seems to vary depending on exactly what type of caused-walking the speaker has in mind? This assumption, in turn, suggests a radical view of linguistic representations: If the grammatical form of an utterance is determined in part by event semantics, then, in order to formulate novel grammatical utterances, speakers must store the event semantics associated with previous utterances. This leads to a radical exemplar view of language acquisition (e.g., Chandler, 2010; Ambridge, in press), under which learners store detailed episodic representations of input sentences that contain both phonological and (understood) event-semantic information.

This view may be quite radical (at least in child-language circles), but the alternatives are simply untenable. One alternative ("splitting") is to posit tens, hundreds, or even thousands of different senses of each word, each with a distinct lexical entry (e.g., *walk* [non-causal], *walk* [of a dog], *walk* [of a child], *walk* [of a batter]). The problem here is that once you start splitting, you can't stop. "*walk* [non causal]" sounds at first like a plausible lexical entry. But actually, it must subsume almost infinitely many different types of walking: a batter walking to first base, one party leaving a negotiation (even if no literal walking occurs), an Olympian taking part in a walking race, a guitarist walking through a complex solo before trying to play it at full speed, and so on. The other alternative ("lumping") is to

posit that the meaning of each word has a prototype structure. But this is arguably even worse (from Ambridge, in press):

> Do speakers just have a single prototype meaning for *table*, that includes domestic dining tables, beer-barrel bar tables and fold-down aeroplane tables?...The lumping approach is unworkable because some (would-be) categories have internal structure. For example, spoons are generally small and metal or large and wooden; but nobody would define a prototypical spoon as one that is of intermediate size and made out of an intermediate wood-metal material (example from Love, 2013).

So now we are back to splitting. But…

> The splitting approach is unworkable, because there is no principled way to stop splitting. Do we have a single prototype of a domestic dining table, or subtypes of wooden and metal tables, or of vintage and modern tables? (or, for that matter, of data tables and of multiplication tables?)

The only solution is to never stop splitting: i.e., to posit an exemplar model in which each and every individual utterance is stored.

To end, as I began, on a personal note: With regard to the problem of the retreat from argument structure overgeneralization errors, I have come a long way in short time (well, 17 years): from the initial conviction that the problem could be solved fairly simply by the learning of surface verb+construction co-occurrence statistics (i.e., preemption and/or entrenchment) to the view that speakers store every utterance that they hear, along with a highly nuanced representation of its understood semantics. Although I suspect that she finds this current view somewhat too radical, it has been a pleasure and a privilege to undertake this long journey in the company of both Elena herself and her numerous academic offspring.

References

Ambridge, B. (in press). Against stored abstractions: A radical exemplar model of language acquisition. *First Language*. Preprint: https://psyarxiv.com/gy3ah/

Ambridge, B. & Lieven, E.V.M., (2011) *Child Language Acquisition: Contrasting theoretical approaches*. Cambridge, UK: Cambridge University Press.

Ambridge, B., & Lieven, E.V.M. (2015). A Constructivist account of child language acquisition. In B. MacWhinney and W. O'Grady (Eds). *Handbook of Language Emergence.* Hoboken, NJ: Wiley Blackwell. (pp. 478-510).

Ambridge, B., Barak, L., Wonnacott, E., Bannard, C., & Sala, G. (2018). Effects of both preemption and entrenchment in the retreat from verb overgeneralization errors: Four reanalyses, an extended replication, and a meta-Analytic synthesis. *Collabra: Psychology, 4*(1), 23. DOI: http://doi.org/10.1525/collabra.133.

Ambridge, B., Pine, J. M., Rowland, C. F., Jones, R.L, & Clark, V. (2009). A semantics-based approach to the 'no negative-evidence' problem *Cognitive Science*, 33(7), 1301-1316.

Ambridge, B., Pine, J.M. & Rowland, C.F. (2012). Semantics versus statistics in the retreat from locative overgeneralization errors. *Cognition, 123*(2) 260–279.

Ambridge, B., Pine, J.M., Rowland, C.F. & Young, C.R. (2008) The effect of verb semantic class and verb frequency (entrenchment) on children's and adults' graded judgements of argument-structure overgeneralization errors. *Cognition. 106(1), 87-129.*

Bidgood A., Pine, J.M., Rowland, C.F., Sala, G., Freudenthal, D.T. & Ambridge, B. (submitted). Verb argument structure overgeneralisations for the English intransitive and transitive constructions: Grammaticality judgments, production priming and a meta-analytic synthesis. Preprint: https://osf.io/4ns9d/

Bowerman, M. (1982). Evaluating competing linguistic models with language acquisition data: implications of developmental errors with causative verbs. *Quaderni di Semantica, 3*. 5-66.

Bowerman, M. (1988). The "no negative evidence" problem: how do children avoid constructing an overly general grammar? In J. A. Hawkins (Ed.), *Explaining language universals* (pp. 73-101). Oxford: Blackwell.

Bowerman, M., & Croft, W. (2007). The acquisition of the English causative alternation. In M. Bowerman & P. Brown (Eds.), Crosslinguistic perspectives on argument structure: Implications for learnability (pp. 279– 307). Hillsdale, NJ: Lawrence Erlbaum.

Braine, M. D. S., & Brooks, P. J. (1995). Verb argument strucure and the problem of avoiding an overgeneral grammar. In M. Tomasello & W. E. Merriman (Eds.), *Beyond names for things: young children's acquisition of verbs* (pp. 352-376). Hillsdale, NJ: Erlbaum.

Bresnan, J., & Nikitina, T. (2008). The Gradience of the dative alternation. In L. Uyechi and L. Wee (eds). *Reality Exploration and Discovery: Pattern Interaction in Language and Life*. Linda and Lian-Hee Wee. Stanford, CA: CSLI Publications.

Chandler, S. (2010). The English past tense: Analogy redux. *Cognitive Linguistics*, *21*(3), 371-417.

Chouinard, M. M., & Clark, E. V. (2003). Adult reformulations of child errors as negative evidence. *Journal of Child Language, 30*(3), 637-669.

Goldberg, A., E. (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.

Harmon, Z., & Kapatsinski, V. (2017). Putting old tools to novel uses: The role of form accessibility in semantic extension. *Cognitive Psychology*, *98*, 22-44.

Herbst, T., & Stefanowitsch, A. (2011). Preface: Argument structure - valency and/or constructions? *Zeitschrift für Anglistik und Amerikanistik, 59*(4), 315-316.

Hopper, P. J., & Thompson, S. A. (1980). Transitivity in grammar and discourse. *Language*, *56*(2), 251-299.

Lord, C. (1979). Don't you fall me down: Children's generalizations regarding cause and transitivity. In *Papers and reports on child language development (PRCLD) 17*. Stanford, CA: Stanford University Department of Linguistics.

MacWhinney, B. (2004). A multiple process solution to the logical problem of language acquisition. *Journal of child language, 31*(4), 883-914.

Maslen, R. J., Theakston, A. L., Lieven, E. V., & Tomasello, M. (2004). A dense corpus study of past tense and plural overregularization in English. *Journal of Speech, Language, and Hearing Research*.

Pinker, S. (1989). *Learnability and cognition: the acquisition of argument structure.* Cambridge, MA. MIT Press.

Ramscar, M., & Yarlett, D. (2007). Linguistic self-correction in the absence of feedback: A new approach to the logical problem of language acquisition. *Cognitive Science*, *31*(6), 927-960.

Shibatani, M. & Parsdeshi, P. (2002). The causative continuum. In M. Shibatani (ed.) *The Grammar of Causation and Interpersonal Manipulation*. Amsterdam: John Benjamins (pp. 85-126).